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(56) Documents Cited

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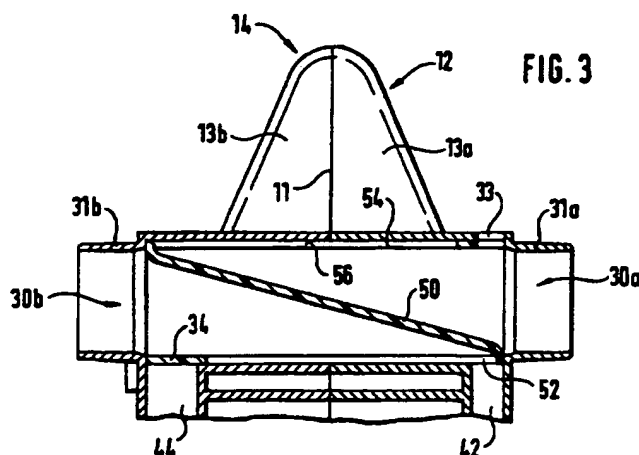
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(54) Abstract Title

Hand-held planing machine

(57) A hand-held planing machine (10, see Fig. 1) has a housing 12 and an electric motor (48, see Fig. 2) driving a planing roller (38, see Fig. 2) and a fan wheel (46, see Fig. 2). The air flow from the fan is directed through ducts 30a, 30b via ducts 42, 44 and entrains shavings from duct (39, see Figs, 2, 4, 5). The air flow and shavings are directed through either duct 30a or duct 30b by tube-like valve 34, which is mounted in housing shells 13a, 13b in an axial- and radial-clearance free manner. Thus a vacuum pipe attached to ducts 30a or 30b cannot inadvertently rotate the valve and cause shavings to be emitted in an unwanted direction. The valve has a lever 32 for selecting the direction of air flow.



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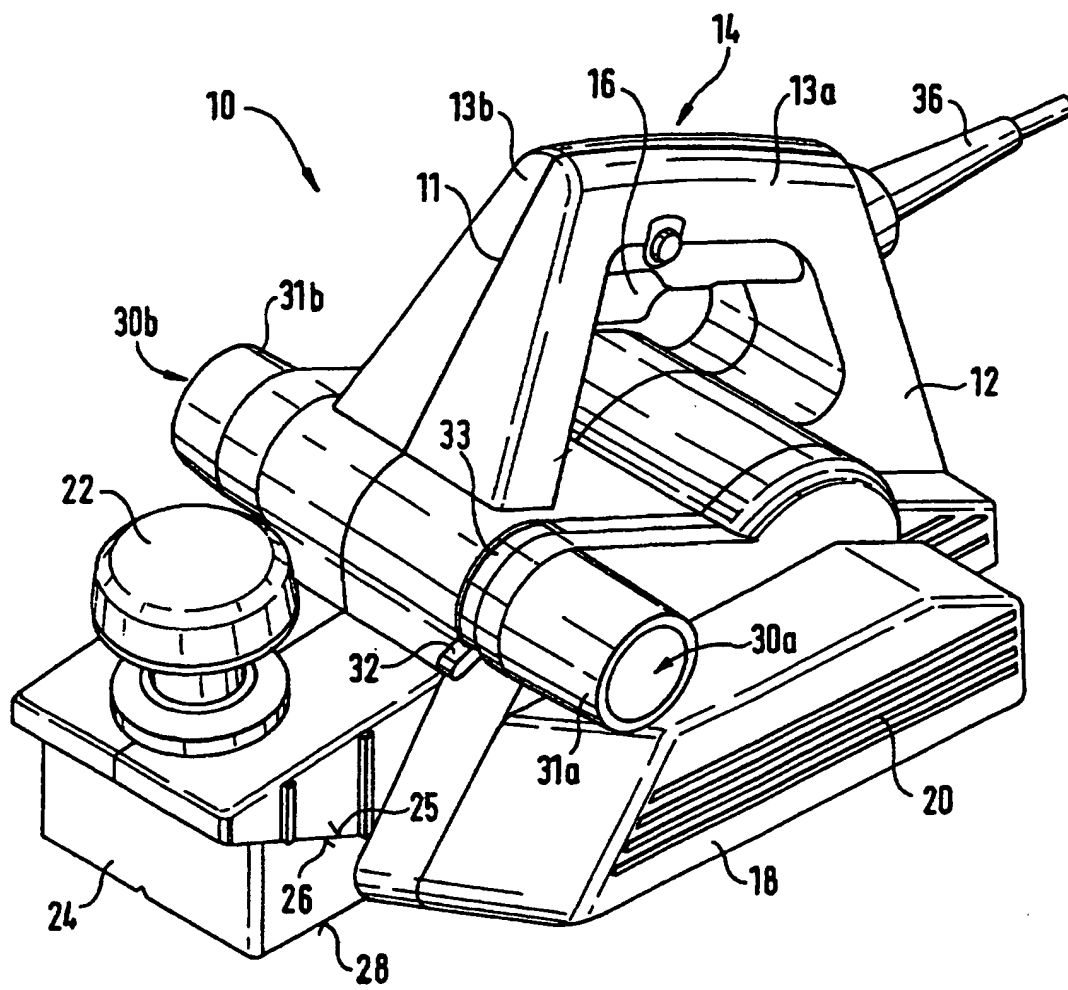
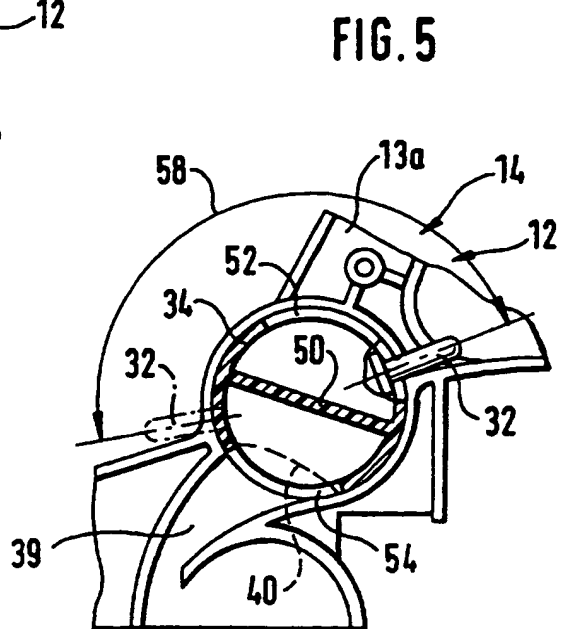
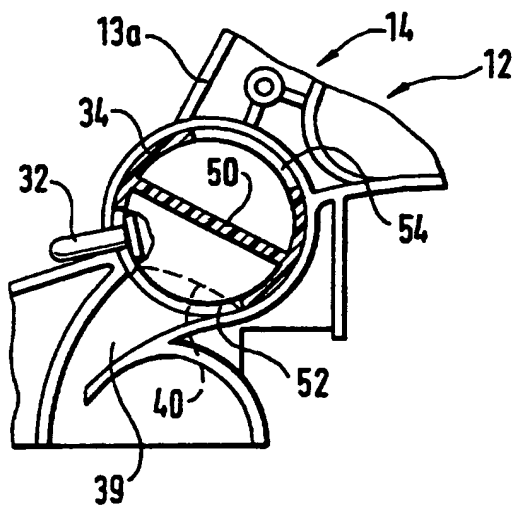
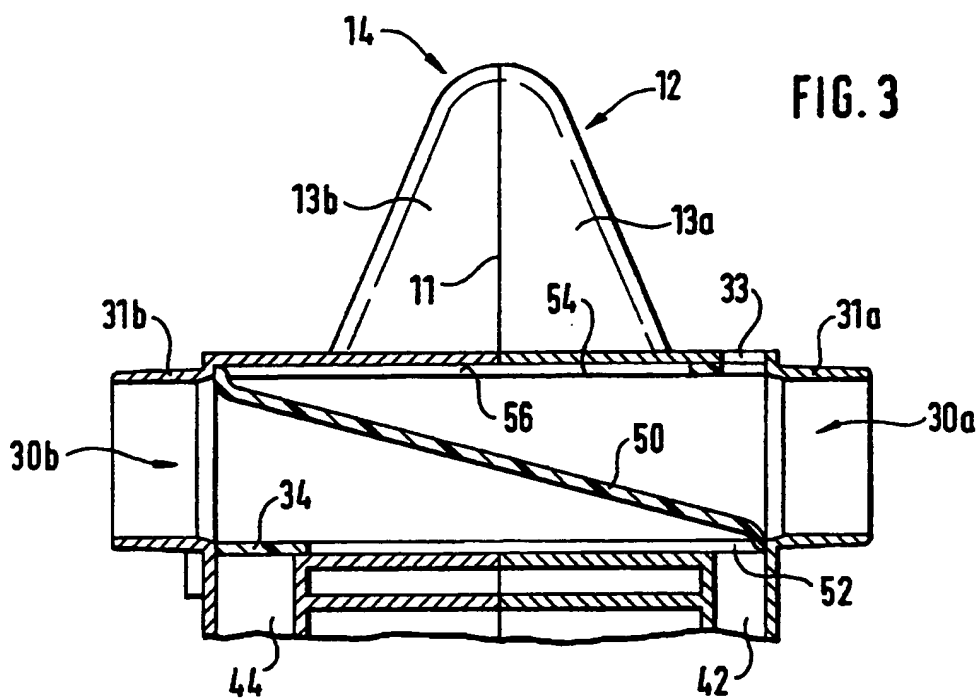


FIG. 1



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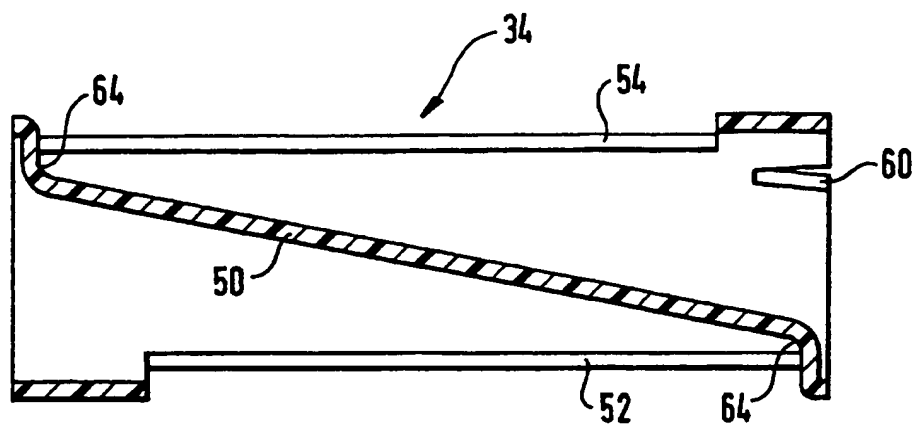


FIG. 6

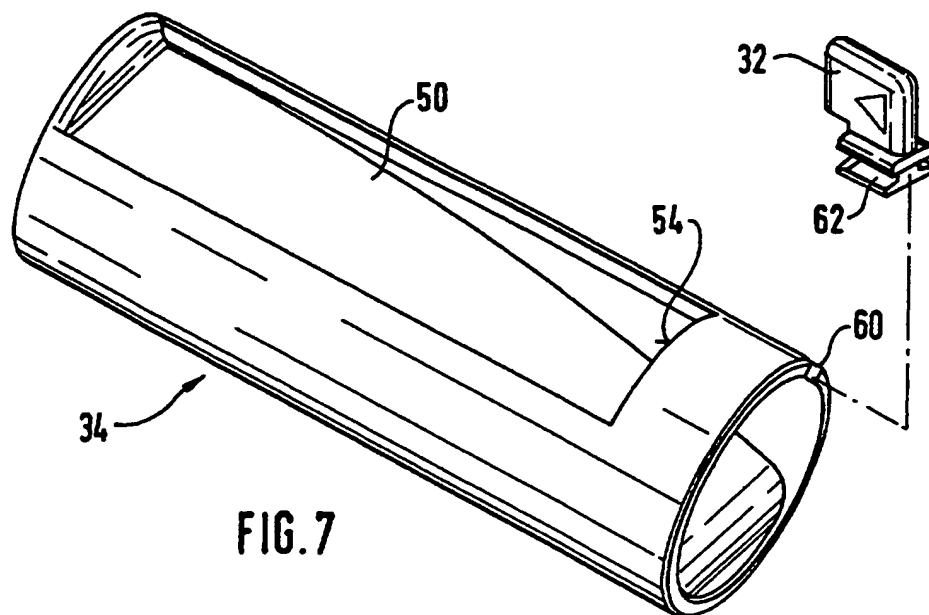


FIG. 7

Hand-held planing machine

Prior art

The starting point for the invention is a hand-held planing machine of the kind in claim 1.

A generic hand-held planing machine is known through EP 563 350, in which the shavings can be conveyed sideways towards the left or right out of a shavings-conveying duct near the planing roller. This is done by means of a flow of blown air. This flow can be guided out of the interior of the plane housing to two shavings outlet apertures disposed on opposite sides of the said housing. The shavings outlet apertures, which are disposed transversely to the direction of advance of the hand-held planing machine, are intended to be opened towards one or other side alternately, and thereby to be capable of being unblocked for the egress of the shavings.

The switching-over of the ejection of shavings towards one or other side is regulated by rotating a tube-like valve about its axis. The alternation of the direction of egress is brought about by a separating wall in the interior of the valve which divides the latter and runs obliquely in the longitudinal direction.

The known hand-held planing machine has a housing of pot-shaped construction, out of which the tube-like valve projects at both ends.

In this machine, the switching-over of the ejection of shavings into one or other direction functions conveniently and reliably. However, unintentional changing of the direction of ejection is not ruled out when a dust-extracting device is connected to the ends of the valve which project laterally beyond the housing.

This is done by slipping a pipe socket belonging to a vacuum cleaner or the like onto one of the ends of the valve, under which circumstances the latter can be twisted during the planing operation. As a result of this, the direction of ejection of the shavings is changed in an unchecked manner, so that the ejection of shavings may possibly occur towards both sides simultaneously, or towards the side on which no dust-extracting connecting piece is connected to the valve cylinder, so that the shavings pass into the atmosphere in an unintended manner.

Advantages of the invention

In contrast to this, the hand-held planing machine according to the invention, which has the characterising features of claim 1, in particular the fact that the ends of the valve do not protrude freely towards the outside, has the advantage that dust-extracting devices can be connected to its valve without the valve cylinder being capable of being twisted unintentionally. This avoids the danger of the egress of shavings in the wrong direction. In addition, the valve is shorter and lighter in this solution.

Through the fact that the housing shells or the lateral covers carry pipe sockets which are in alignment with the valve, twist-proof fastening of the connecting means of an external dust-extracting device, and also efficient extraction, are possible.

Through the fact that the housing shells are connected to the pipe socket in a rotation-proof manner, in particular in one piece, the housing of the hand-held plane is particularly dimensionally stable.

Through the fact that the housing shells have, in the region of at least one of the pipe sockets, a radial slot for adjusting the setting lever for turning the valve, which setting lever passes through the said slot, the direction of ejection of the shavings can be regulated in a manner which is favourable from the handling point of view.

Through the fact that the ends of the slot - serving as stops - restrict the adjustment travel of the setting lever, and with it the twisting travel of the valve, in the region of one of the pipe sockets, reliable regulation of the direction of ejection of the shavings is possible.

Through the fact that the pipe sockets form, adjacent to the ends of the valve, axial stops and sealing faces, the valve is mounted in a particularly leakproof manner in relation to the housing. This improves the efficiency with which the shavings are conveyed.

Through the fact that the setting lever for twisting the valve can be clipped into the latter, the said valve is of particularly simple construction and can be fitted in a simple manner.

Drawings

The invention is explained with the aid of the following description with appertaining drawings.

Figure 1 shows a three-dimensional representation of the hand-held plane according to the invention, viewed from the front,

figure 2 shows a longitudinal section through a hand-held plane according to figure 1,

figure 3 shows, in detail form, a cross-section through the said hand-held plane in the region of the shavings outlet duct,

figures 4 and 5 show an enlarged longitudinal section through the hand-held plane in the region of the shavings outlet duct, with the valve in different positions,

figure 6 shows the valve as an individual item, in longitudinal section, and

figure 7 shows a three-dimensional representation of the valve as an individual item, with the setting lever.

Description of the exemplified embodiment

Figure 1 shows a hand-held planing machine 10 with a housing 12 which consists of two housing shells 13a, b which are fitted laterally to one another on a central separating line 11 and are screwed to one another in a tightly contiguous manner.

In the upper region, the housing 12 has a handle 14 in which a switch key 16 for switching the motor 48 (figure 2) on and off is disposed.

At the side, the hand-held planing machine 10 carries a cover 18 for the lateral region of the housing, which cover has ventilating slots 20. Protruding upwards from the front region of the housing 12 is an additional handle 22 which serves as a setting knob for changing the depth of cut. When this is turned, a setting wedge 24, which is disposed underneath it in a longitudinally adjustable manner and is supported by its upper inclination 25 on a counter-inclination 26 on the housing 12, is displaced. When angular displacement occurs, the position of the sole 28 of the setting wedge 24 changes vertically and horizontally in relation to the housing 12, the vertical change in position leading to a change in the cutting depth

setting and, thereby, in the depth of cut in relation to the planing roller 38 (figure 2).

Behind the additional handle 22, there extends, transversely to the separating line 11, a cylindrical convexity in the housing 12, which terminates on either side in a shavings outlet duct 30a, 30b in each case, which is shaped as a pipe socket 31a, b. Disposed on the right-hand side, in the direction of viewing, in the region of the pipe socket 31a is a radially projecting setting lever 32 which can be swivelled about the axis of the pipe socket 31a, b and is guided in a radial slot 33. When pivoted, the setting lever 32 entrains a tube-like valve 34 (figures 3 to 7).

Passing out at the rear end of the housing 12 is an electric cable 36 which serves to supply power to the motor 48 for operating the hand-held planing machine 10.

The partial longitudinal section shown in figure 2 through a hand-held planing machine 10a which is identical, in principle, with the exemplified embodiment according to figure 1 shows, in broken lines, the planing roller 38 with radially projecting planing knives 37a, b, which planing roller is mounted so as to be rotatable about an axis, transversely to the hand-held planing machine 10a, and can be operated in accordance with the rotational direction arrow 41. Adjoining the planing roller 38 in a radially adjacent manner is a shavings-conveying duct 39 formed by housing walls 12'. Shavings removed from a workpiece are flung into the said duct by the rotating planing roller 38 and are conveyed onwards through the shavings-conveying duct 39, and out of the latter, by a flow of air. At the top, the shavings-conveying duct 39 terminates in a shavings discharge aperture 40 which can be restricted by the valve 34.

At the end of the shavings-conveying duct 39, the apertures of two air-guiding ducts 42, 44 (see also figure 3), which are drawn in broken lines and are represented diagrammatically, open into window-like openings 52, 54 in the valve 34. These are connected hydrodynamically to a fan wheel 46 coupled to the motor 48 and direct towards the outside the flow of air for conveying the shavings. The fan wheel 46 first takes in the (cooling) flow of air over the motor 48 from outside and pumps it onwards through the air-guiding ducts 42, 44. This flow of air is directed by the orifices of the air-guiding ducts 42, 44 at the upper end of the shavings-conveying duct 39 through the hollow-cylindrical valve 34 and laterally out of the shavings outlet duct 30a or 30b, depending upon the shavings blow-out direction selected, and entrains the shavings conveyed into the shavings-conveying duct 39 by the planing roller 38.

Figure 2 represents, in a detail, the setting wedge 24a with the sole 28a and the upper inclination 25a which is supported on the counter-inclination 26a on the housing 12a. The reference symbols used in figure 2 have the letter "a" added to them in each case because of the minor differences in the representation compared with figure 1, without mentioning them separately here.

Figure 3 shows a cross-section through the hand-held planing machine 10 according to figure 1 in the region of the shavings outlet duct 30a, b. The housing shells 13a, 13b which are joined together centrally at the separating line 11 and which form the handle 14 (figure 1) at the top, receive the cylindrical valve 34 after the fashion of a holder so that the said valve is rotatably mounted in an axially and radially leakproof manner in relation to the housing walls 56, which are of tube-like construction. Also visible are the separating wall 50, which runs diagonally along the valve 34, and the window-like openings 52, 54 which extend on opposite sides over the convex surface of the cylindrical face of the valve 34.

When the valve 34 is in the position shown in figure 3, the blow-out direction runs towards the left, in the direction of viewing, because the separating wall 50 directs the conveying flow from the opening 52 towards the left, and prevents it from passing out towards the right. If the opposite opening 54 is turned downwards in the direction of viewing, the direction of ejection of the shavings points towards the right.

Figures 4 and 5 illustrate, in detail form, the shape of the shavings-conveying duct 39 in the housing 12 in longitudinal section and, in addition, the way in which the valve 34 is provided with a toggle-like setting lever 32 which protrudes radially outwards and can be swivelled about the longitudinal axis of the valve 34, together with the latter, so that the openings 52, 54 - which are separated by the separating wall 50 - face towards or away from the shavings discharge aperture 40. Figure 5 illustrates - in a manner going beyond figure 4 - the adjustment travel 58 of the setting lever 32 over an angular range of about 170° from one end location - which is drawn in broken lines - into the other - which is drawn in solid lines - for the purpose of changing the direction of ejection of the shavings.

Figure 6 shows, in longitudinal section, the individual item constituted by the valve 34, with the openings 52, 54 and a clipping-in aperture 60 for receiving the setting lever 32, under which circumstances it becomes clearer than in the preceding figures that the separating wall 50 has gently curved transitions in relation to the cylinder wall of the valve 34.

Figure 7 shows a three-dimensional representation of the valve 34 according to figure 6, with the separating wall 50 and the setting lever 32, which setting lever can be clipped in in relation to the lateral clipping-in aperture 60 at the end of the

valve 34 and carries a dovetail guide 62 for locking retention in the slot-like clipping-in aperture 60.

All the faces of the valve 34 which are exposed to the conveying flow of air or to contact with shavings which are being transported away have a high surface quality and are preferably chromium-plated. This presupposes that the material of the valve cylinder 34 consists of suitable material, in particular plastic, which is heat-treatable. The inner faces of the pipe sockets 31a, b also have a high surface quality or are chromium-plated, just as is, alternatively, the shavings-conveying duct 39. A surface which is heat-treated in this way improves the efficiency with which the shavings are transported away, and distinctly inhibits clogging of the shavings-conveying duct or of the valve cylinder 34.

Claims

1. Hand-held planing machine (10) with a housing (12) in which a planing roller (38), which can be rotatably driven by a motor (48), in particular an electric motor, is mounted, as well as a fan wheel (46) which is coupled to the motor (48) and is adjoined by air-guiding ducts (42, 44) which merge into a shavings outlet duct (30a, b) with a tube-like valve (34) and which direct a flow of air which is generated by the fan wheel (46) and serves for transporting away and ejecting planing shavings, the direction of ejection being capable of being switched over from one to the other side of the hand-held planing machine (10) alternatively by rotation of the tube-like valve (34) about its axis, characterised in that the valve (34) is mounted, particularly in a radially and axially clearance-free manner, in a housing (12) which can be assembled from a number of shell-shaped parts (13a, 13b).
2. Hand-held planing machine according to claim 1, characterised in that the valve (34) is enclosed by the housing (12) in such a way that it protrudes out of the said housing (12) with a setting lever (32), of which, in particular, there is at least one, and which serves to rotate the valve (34) by hand.
3. Hand-held planing machine according to claim 1 or 2, characterised in that the housing shells (13a, b) have pipe sockets (31) which are in alignment with the valve (34) and which carry the said valve (34).
4. Hand-held planing machine according to claim 3, characterised in that the housing shells (13a, b) are connected to the pipe sockets (31a, b) in a rotation-proof manner, particularly in one piece.

5. Hand-held planing machine according to claim 4, characterised in that at least one of the housing shells (13a, b) has, in the region of at least one of the pipe sockets (31a, b), a radial slot (33) for the passage of the setting lever (32).

6. Hand-held planing machine according to claim 5, characterised in that the slot (33) determines the twisting travel of the setting lever (32) and, with it, the setting position of the valve (34) or direction of ejection of the shavings.

7. Hand-held planing machine according to claim 6, characterised in that the pipe sockets (31a, b) form axial stop faces and sealing faces opposite the ends of the valve (34).

8. Hand-held planing machine according to claim 7, characterised in that the setting lever (32) can be clipped, in particular over-locked, into at least one of the ends of the valve (34).

9. Hand-held planing machine according to claim 8, characterised in that the housing (12) and the valve cylinder (34) consist of plastic which can be chromium-plated.

10. Hand-held planing machine according to claim 8, characterised in that the faces of the housing (12) which guide the shavings to be transported away are heat-treated in respect of their surfaces, particularly chromium-plated, particularly in the region of the valve cylinder (34).

11. A hand-held planing machine substantially as herein described with reference to the accompanying drawings.



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Claims searched: 1 to 11

Examiner: Graham S. Lynch
Date of search: 7 October 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B5L

Int Cl (Ed.6): B23Q 11/00; B27C 1/00, 1/10, 1/14; B27G 3/00

Other: None

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A, P	GB 2323809 A BOSCH. See whole document.	
Y	GB 2075421 A SCINTILLA. See whole document.	1, 2.
Y	EP 0221652 A1 BLACK & DECKER. See whole document.	1.
A	EP 0153578 A1 REICH. See Figure 2.	
Y	WO 93/08004 BOSCH. See whole document.	1, 2.

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